GEOLOGY AT THE BRITISH ASSOCIATION.

The address of the President of the Section, Sir Archibald Geikie, already published in this Journal was conspicuous for the definiteness of its reliance on geological evidence as opposed to that derived from physical principles. He claimed, it will be remembered, that the importance of this evidence had never been weighed or appreciated by Lord Kelvin, while not a few physicists, including Darwin and Perry, are not in agreement with Lord Kelvin as to the extreme limitations imposed by his more recent estimate. It is interesting to note that almost simultaneously with the British Association meeting, there was published by the Royal Dublin Society a paper by Professor Joly in which he calculates that if the sodium in the sea and preserved in beds of rock salt were all derived by denudation from rocks in the earth-crust, at the present known rate of transport by rivers, from 80,000,000 to 90,000,000 years would have been necessary for its accumulation.

On account of the visit of the French and Belgium Geologists the President's address was not given till Saturday. The proceedings of the Section were therefore opened by papers on the South Eastern Coalfield, an account of which has already appeared in the columns of Science. Germane to this subject was a short note by Mr. Jukes-Browne on a boring through the Chalk and Gault near Dieppe. Beneath the sandy base of the Gault clay the waterbearing lower greensand was met with, and the section proved that the Folkestone and Wissant facies of the Gault extended for 52 miles southward.

No papers on the more ancient rock systems were read during the meeting, the earliest rocks dealt with being the carboniferous. Mr. Gibson's recent work in the North Staffordshire Coalfield is interesting not only because his important economic results flow chiefly from work in rocks of no economic value, but because it shows that detailed scientific work may reveal facts of important economic value even in a region pierced in every direction by mine shafts and worked continuously for centuries. For many coming years in Britain most vital facts, from a commercial point of view, with regard to the distribution of coal and iron, will be gradually accumulated by borings and sinkings through the neozoic rocks. Unless a systematic record of these borings is kept at a central bureau, their value to the nation will be lost and work will have to be done over again by private individuals, at a cost of millions. Much of this might be saved if observations are accumulated as they are obtained so as to give a good idea of the sub-triassic structure of the whole country.

Mr. Greenly exhibited photographs of funnel-shaped 'pipes' bored through the carboniferous limestone of Anglesey and filled with deposits of sandstone continuous with the beds above. The report of Mr. Garwood on the zoning of the British carboniferous rocks shows that though the difficulties surrounding this subject are lessening they have not yet been cleared away. Most of the zone fossils hitherto employed are not capable of more than restricted local use.

Mr. Wedd finds that in places the Bunter sandstone is cemented with barium sulphate, a fact frequently noted in the basal beds of the Keuper sandstones. Professor Watts described and showed photographs of the surface of the granite under the Keuper marls of Leicestershire. This possessed many of the features of wind eroded rocks, and one piece of granite exhibited was grooved and polished and presented an appearance recognized by many geologists present as characteristic of Æolian action.

The following new classification of the Pliocene deposits of the east of England was proposed by Mr. F. W. Harmer; Older Plio-

cene including the Lenhamian (Lenham Beds); newer Pliocene including Gedgravian (Coralline Crag); Waltonian (Walton and Oakley horizons); Newbournian, Butleyan, Icenian (Norwich Crag); Chillesfordian and Weybournian (Weybourne Crag and Forest Bed Series). The same author pointed out that shell accumulations comparable to the 'crags' are now only found on shores, such as Holland, open to prevalent southwesterly gales. He suggests that in Pliocene times Scandinavia may have been anticyclonic, diverting the winds in eastern England so that easterly gales were common. He further suggests that during the Glacial Epoch the ice-sheet of northern Europe might have been an anticyclonic center like Greenland at the present day. Evidence in favor of ice-sheet action in Anglesey was furnished in a paper by Mr. Greenly and Mr. Kendall reported on Erratic Blocks, dealing chiefly with Scandinavian and Cheviot boulders in Yorkshire. Mr. Lomas proposed to restrict the term 'moraine' to stationary deposits and the word 'rock-train' to *débris* riding on or moving with the ice.

The investigations carried on by a committee, of which Sir William Dawson is chairman and Professor Coleman secretary, succeeded in demonstrating, after meeting with many difficulties, that the warm climate beds of the Don Valley in Canada underlie the cold climate beds of Scarborough and that both series, underlain and covered by boulder clays, were interglacial in age. The fossil leaves and wood will be determined in time for the final report next year.

The committee on Irish elk remains in the Isle of Man has not as yet succeeded in its principal task. The committee on the Ty Newydd Caves in North Wales presented their final report in which they correlated the successive deposits with those of the Ffynnon Benno Caves, studied by Dr. Hicks, and concluded that the deposits in them were earlier than the boulder-clay of the district with northern and western erratics.

The exhibition of specimens of Eolithic and Paleolithic flints, including one obtained by Dr. Kerr from Folkestone, led to a brisk discussion on the antiquity of man, in which Sir John Evans, one of the first Englishmen to study the gravels of the Somme with Boucher de Perthes, declined to admit that the so-called Eolithic implements furnished any evidence of the existence of pre-Paleolithic man. This opinion he reiterated in a short paper read in the Boulogne Museum on the occasion of the visit of the Association to that town at the end of the meeting.

Amongst the paleontological papers may be mentioned Professor Rupert Jones' report on Paleozoic Phyllopoda, and an interesting exhibition by Dr. Rowe of slides, showing recent developments of photo-micrography of opaque objects as applied to the delineation of the minute structure of fossils. Professor Sollas initiated a discussion on homotaxy and contemporaneity, in which he concluded that the geological clocks in different localities were, figuratively speaking, never more than minutes and seldom more than seconds wrong.

Professor Renard announced that by subjecting quartzite, enveloped in an alloy, to hydrostatic pressure equal to 5,000 atmospheres, he had produced granulation in the quartz identical with that seen in silicate meteorites. Professor Sollas was able to bring positive proof of the existence of abundant sponge spicules in the chalk which are now represented by hollow casts to the extent of sometimes 3 per cent. of the rock.

Some beautiful examples of wave photographs were shown by Mr. Vaughan Jennings, including waves in rock, lava, mud, sand, soil-terraces and sand dunes. Dr. Tempest Anderson exhibited photographs

of the eruption of Vesuvius in 1898, and read a note by Professor Plalania on the recent eruption of Etna.

An interesting investigation, initiated by Professor Kendall and others, is being carried on to ascertain the course of the underground waters in the Craveri (Carboniferous Limestone) district of Yorkshire. Common salt, salts of ammonia, and fluorescin were placed in quantity in the 'sinks' and the water issuing miles away was periodically analyzed with the result of tracking the course of several underground drainage systems.

The Geological Photograph Committee exhibited a large series of prints and gave an account of the year's collection. It was resolved to publish a representative series of geological photographs if sufficient support was guaranteed to make the scheme self-supporting.

W. W. Watts.

SCIENTIFIC BOOKS.

The Mysterious Mammal of Patagonia, Grypotherium Domesticum. By Rudolph Hauthal, Santiago Roth and Robert Lehmann Nitsche. Revista del Museo de La Plata. Vol. IX. Pp. 409–474.

Under the above title the authors have issued a series of papers containing 65 pages of text and accompanied by five plates; dealing principally with that curious mammal to which Dr. Ameghino some two years ago gave the name of Neomylodon Listai.

Ameghino based his generic and specific descriptions upon a few small endermal ossicles and certain stories or traditions said to be current among the Indians of Patagonia concerning the existence of such an animal, and upon verbal descriptions of a piece of skin presumably belonging to a large gravigrade edentate. This piece of skin was found in a dessicated condition by Dr. Otto Nordenskjöld and Mr. Hermann Eberhard in a cavern near Consuelo Cove, in Last Hope Inlet, on the west coast of southern Patagonia.

Dr. Ameghino's announcement aroused great interest and has been frequently noted, both in scientific and popular journals, chiefly on account of the opinion advanced by him that this great sloth still exists in the interior of Patagonia and at present causes extreme terror among the Indians by its intensely predaceous habits!

During the past season Dr. Hauthal visited the cave from which the first piece of skin was obtained by Dr. Nordeskjöld and was successful in securing other pieces of skin associated with many bones and parts of skulls, showing the complete dentition. Associated with these remains he also found bones of other animals, principally belonging to the following genera: *Homo*, *Felis*, *Canis*, *Equus*, *Onohippidium*, *Auchenia*, *Mephitis*, *Rhea*, etc., together with stone and bone implements, mingled with charcoal and charred fragments of bones.

Dr. Hauthal gives a description of the cave with a diagram, showing where the more important finds were made. He also mentions several other unexplored caves in the same neighborhood.

Dr. Roth gives a classification and description of the different mammalian remains found, and reaches the conclusion that the sloth to which the skin, described at second hand by Ameghino belonged, does not represent a new genus. This is shown by a study of the skulls, teeth and other parts of the skeleton, found associated with pieces of skin, and which, according to Roth are not generically distinguishable from Grypotherium of Reinhardt, from the Pampean beds further north.

Dr. Roth places little reliance on the tales purporting to come from the Indians regarding the terrible animal frequenting regions adjacent to the larger lakes and rivers of the interior and which are said to attack and carry off their horses. He believes that at most this is only a tradition among them of the former existence of a very large cat, a few remains of which were found in the cave, and which though at present extinct may have existed contemporaneously with the present Indians of Patagonia several generations ago.

The habits attributed to this terrible animal, according to Ameghino by the Indians, are certainly more like those we should expect to find